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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/035,503 | 10/25/2001 | Katsuji Iguchi | SLA0636 | 3213 |

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07/23/2003

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EXAMINER

LATTIN, CHRISTOPHER W

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 07/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,503

Applicant(s)

IGUCHI ET AL.

Examiner

Christopher W Lattin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Szluk et al. (U.S. Patent 4,703,551).

Szluk et al. teach a method of forming a MOS device on a silicon substrate 10, comprising preparing a substrate to contain a conductive region 13 of a first conductivity type having a first device active area; forming a gate electrode structure on the first device active area, said gate electrode structure including a gate electrode 16p and insulating sidewalls 29p; implanting ions of an opposite conductivity type from that of said first device active area into the exposed portions of said conductive region to form source and drain regions 27p and 28p on opposite sides of said gate structure; and depositing by selective CVD a silicide layer 41p, 42p, and 46p over said source and drain regions and over said gate electrode. See especially column 9 line 61- column 10 line 7.

Claims 6, 10, 15, 16, 17 and 22 rejected under 35 U.S.C. 102(b) as being anticipated by Tsai et al. (U.S. Patent 5,757,045).

Tsai et al. teach a method of forming a CMOS device on a silicon substrate, comprising: preparing a substrate 1 to contain a conductive region 7 of a first type having a first device active area therein, and to contain a conductive region of a second type 10b having a second device active area therein; forming gate electrodes 12 on the first and on the second active areas; depositing and forming a gate electrode sidewall insulator 14 layer on each gate electrode; masking the first device active area; implanting ions of a first type into the exposed portions of the second device active area to form a source region 16 and a drain region 16 in the second device active area; stripping the mask 15; masking the second device active area; implanting ions of a second type into the exposed portions of the first device active area to form a source region 18 and a drain region 18 in the first device active area; stripping the mask 17; depositing a silicide layer 19 over the gate electrodes and the source and drain region in the first and second device active areas and depositing an insulating layer 29 over the structure and metallizing the structure with layer 29.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szluk et al. (U.S. Patent 4,703,551) in view of Wu (U.S. Patent 6,069,044).

Szluk et al. are applied supra and teach all of the limitations of the presently claimed method, but fail to teach low energy plasma immersion techniques for ion implantation. Wu teach a method of implanting ions using plasma immersion ion implantation at an energy in the range of about 0.5 keV to 2 keV and a dose in a range of about $10 \times 10^{14} \text{ cm}^{-2}$ to $10 \times 10^{15} \text{ cm}^{-2}$ (which corresponds to a concentration $10 \times 10^{19} \text{ cm}^{-3}$ to $10 \times 10^{22} \text{ cm}^{-3}$) in order to form shallow junction regions. It would have been obvious to one skilled in the art at the time of the invention to implant using plasma immersion ion implantation and the parameters indicated to form shallow junction regions that can perform at high speeds.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Szluk et al. (U.S. Patent 4,703,551) in view of Tsai et al. (U.S. Patent 5,757,045).

Szluk et al. are applied supra to claim 1 and teach all of the limitations of the presently claimed method, but fail to teach depositing an insulating layer over the structure and metallizing the structure. Tsai et al. teach that it is well known to form an insulating layer and metallizing the structure to form connections to the device. It would have been obvious to one skilled in the art at the time of the invention to form an insulating layer and metallizing the structure in order to form electrical connections for the device.

Claims 7-9 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al. (U.S. Patent 5,757,045) in view of Wu (U.S. Patent 6,069,044).

Tsai et al. are applied supra and teach all of the limitations of the presently claimed method, but fail to teach low energy plasma immersion techniques for ion implantation. Wu teach a method of implanting ions using plasma immersion ion implantation at an energy in the range of about 0.5 keV to 2 keV and a dose in a range of about $10 \times 10^{14} \text{ cm}^{-2}$ to $10 \times 10^{15} \text{ cm}^{-2}$ (which corresponds to a concentration $10 \times 10^{19} \text{ cm}^{-3}$ to $10 \times 10^{22} \text{ cm}^{-3}$) in order to form shallow junction regions. It would have been obvious to one skilled in the art at the time of the invention to implant using plasma immersion ion implantation and the parameters indicated to form shallow junction regions that can perform at high speeds.

Response to Arguments

Applicant's arguments filed 5/22/03 have been fully considered but they are not persuasive. Arguments made with respect to claims 6 and 17 and their dependants are moot in view of the new grounds of rejection necessitated by applicant's amendment.

Applicant argues that Szluk et al. fail to teach single-step implantation. Firstly, claims 1 and 11 fail to limit the invention to single step implantation as the transition "comprising" leaves the method open to additional steps. Secondly, even if the claims did limit the method to only one implantation step, the Szluk et al. reference apparently teaches a solo implantation step to form source/drain regions 28N. Applicant's argument that multiple implantation steps are taught to form source and drain regions is

not persuasive, as one skilled in the art would recognize LDD (lightly doped drain) regions as independent of the source/drain regions. Finally, though the amendments to claims 6 and 17 overcome the rejection of those claims under Szluk et al., Tsai et al. teaches the claimed method. It should be noted that claiming a single step of implantation for forming source/drain regions does not limit the entire method to only one implantation step for the formation of any region and thus does not bar the use of Tsai et al. which teaches other implantation steps such as those used to form ultra lightly doped drain (ULDD) regions 21, 22 and ultra shallow junction extension 23. The rejection is maintained as proper.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of


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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Lattin whose telephone number is (703) 305-3017. The examiner can normally be reached Monday through Friday from 8:00 A.M. to 5:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached at (703) 308-3325. The fax numbers for this Group are (703) 872-9318 for responses to non-final actions and (703) 872-9319 responses to final actions.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

CWL 
July 21, 2003


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800